A Retrospective Study on the Hospital Prevalence of Pulmonary Tuberculosis in Niger, Taraba and Kogi States Between 1990 and 1994

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ABSTRACT

A five-year retrospective study of human tuberculosis (TB) was conducted in selected towns in Kogi, Niger and Taraba States from 1990 to 1994 using hospital records. During this period, 6,506 were recorded in the three states, with 330 (5%) occurring in Kogi State and 363 (5.6%) and 5,813 (89.3%) in Niger and Taraba States respectively. In all the three states, it was discovered that the morbidity and mortality rates of the disease were consistently higher in males than in females. There appeared to be a fluctuating pattern of yearly distribution of TB in all the states studied but generally, it could be said to have declined over the five-year study period (1990 to 1994).

Key words: X-chromatin, drumstick, buck, testis, goat, cryptorchidism

INTRODUCTION

Tuberculosis is a chronic debilitating infectious disease of warm-blooded animals including man (Steele, 1980). It has a worldwide distribution and its pulmonary form remains one of the most important communicable diseases in the world presently (Kilpatrick, 1969); with an estimated 5 million cases and an annual mortality of 3 million people (Richards and Baker, 1988). Tuberculosis remains the leading cause of death in the world from a single pathogen while the slow growth of the tubercle bacillus and the lack of easy and reliable tests for detecting the disease at an early stage are among the limiting factors for its successful control and eradication (Allugupalli *et al.,* 1995). In tropical countries such as India, Pakistan, Brazil and Nigeria, 1 to 2% of the population have active pulmonary tuberculosis, while in Britain and other developed countries, there has been a rapid decline in mortality and morbidity rates during the 21st century (Richards and Baker, 1988). A number of predisposing factors are associated with tuberculosis, noticeable among which are occupation and socio-economic status of individuals within a community (Job, 1984). Other important factors include overcrowding, malnutrition and ignorance, which may stem from religious, cultural and/or social beliefs as well as level of education of the individual (Job, 1984). Poor standard of hygiene and failure to take advantage of available preventive measures such as immunization are other possible factors (Anon, 1979).

Despite the recent advances in the prevention and therapy of infectious diseases, tuberculosis remains one of the foremost causes of disability and death throughout the world (Comstock, 1984) particularly among the underprivileged members of the society. In tropical countries like Nigeria, social and religious customs promote the spread of tuberculosis; these include among others, the habit of eating from communal dishes, smoking pipe, prolonged periods of religious fasting, all of which result in compromising the immune system as a result of stress, and non adherence to prescribed medication by patients, leading to drug resistance (Parry, 1976). In Nigeria, the harsh economic environment during the years of the Structural Adjustment Programme, left many TB patients with no alternative than to sell off prescribed drugs for more basic and pressing needs such as food, clothing and housing (Brisibe and Ahmed, 1995). In view of the worldwide resurgence of tuberculosis (Kaufmann and Embden, 1993; Privat, 1993; Brisibe and Ahmed, 1995), there is a need to reappraise the prevalence of the disease and attempt to

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elucidate the socioeconomic factors contributing to its prevalence in various parts of Nigeria. We therefore designed this study to determine the prevalence of TB and the effects of some factors such as age, sex and place of abode of patients as they play out in the mortality resulting from the disease in some parts of the country, namely, Niger, Taraba and Kogi States.

MATERIALS AND METHODS

Location of the study

Data were collected from two selected states in the northern part of Nigeria, Niger and Taraba States, and one state in the middle belt region, Kogi State. Data were obtained from the Chest Wards of the General Hospitals and some private clinics in each of the State capitals.

Method of data collection

Questionnaires designed in tabular manner were administered to the populace with the objective of obtaining information on cases of tuberculosis in the designated hospitals. Attention was given to the socioeconomic indices such as age, sex, occupation, social habits and abode, of the patients spanning over the five-year study period 1990-1994. In Niger State, records of individuals were followed up until recovery or termination.

Subjects

Subjects for the study were children and adult males and females who attended the hospitals as regular in-patients either due to some complaints, or undiagnosed disease conditions or as TB patients. Diagnostic methods used for TB diagnosis in the hospitals and clinics from TB data were obtained include: Case history of the patient, demonstration of acid fast bacilli in sputum, culture method for isolation of *M. tuberculosis* or *M. bovis* in secretions and radiology (roentgenography) following the standard techniques.

Statistical analysis

The Chi-square (χ^2) test was used to compare differences in prevalence in the three different states and in different locations within any given state, and to compare TB prevalence between males and females for statistical significance. (Colton, 1974; Dunn, 1977). The *Central Limit Theorem* (Dunn, 1977) was used *to* transform numerical values and proportions to parametric *standard normal variate (Z),* to calculate probability (P) values to test for significance in variability (Dunn, 1977).

RESULTS

Out of the three cities studied in Niger State, Minna had a significantly (p<0.05) higher prevalence of TB with 237 cases (66.2%) of the 3583 cases recorded (Table 1). Eighty-one (22.3%) and 40 (11.0%) of cases were from Aguara and Paikoro respectively (Table 1).

The total number of males with TB in Niger State was 251 (69.1%) while that of females was 112 (30.9%) of the 363 cases encountered, but there was no significant difference between males and females $\left[\chi^2_{(df,2)} = 4.15 < 5.99 = \chi^2_{(df,0.95)}\right]$ (Table 2). Also from this part of the country, the highest number of cases, 214 representing 59% was recorded in the 16-35 years age group (Table 2). In Taraba State the disease was also more prevalent in males than in females but the age group (=36 years) had the highest number of cases 3,679 compared with 301, and 1,833 in 0-15 and 16-35 years age group (Table 2).

Among the four cities considered in Kogi State, 246 (74.5%) cases out of the total number of 330 in the state were from Lokoja and the number was significantly {[$\chi^2_{(df,1)} = $ 5.34>3.84= $\chi^2_{(df,1)0.95}$], using *Chi-square Goodness of Fit*} more in males 186 (56.4%) than in females 144 (43.6%).

A total of 383 cases were recorded in Niger State for the five-year period with 214 (63. 7%) males and 139 (36.3%) females (Table 3). Though a slightly higher number of cases were encountered during the initial part of the study (1990) with 98 cases, the number declined over the study period with the least number , 58 cases at the end of the study in 1994 (Table 3).

Five thousand eight hundred and thirteen cases were recorded in Taraba State for the five year period with males accounting for a slight majority [3,405 (58.6%)] of cases compared to females [2,408 (41.4%)] (Table 3).

During the period under study, the interval of number of cases was between 1,029 in 1991 to 1,398 in 1990.

There was no significant difference [$\chi^2_{(df,4)0.95}$= 7.7 < 9.49 = $\chi_1(df,4)0.95^{\dagger}2$] in the number of cases recorded during the period of study (Table 3).

The results of the relative risk and the attributable risk of males and females are presented in Table 4.

Seventy-one cases of mortality were recorded in Niger State for the five year period of which 46 (64.8%) were males and 25 (35.2%) were females (Table 5). Within the state, Minna had the highest mortality of 40 (56.3%) while Paikoro area had the lowest number 13 (18.3%) of deaths resulting from TB (Table 5). In all the three

locations in the state, more males than females died of the disease. However there was no significant difference in mortality between males and females [$(\chi^2_{(df, 2)} = 3.05 < 5.99 = \chi_{1((df, 2), 0.95)}{}^{t}2]$.

Table 1. Age distribution of tuberculosis in selected cities in Niger and Taraba States between 1990 and 1994

Location	Number of cases in different age groups (years)			
	0 - 15	16 - 35	36 and above	Total
Niger State				
Minna	16	148	73	242
Aguara	2	53	26	81
Paikoro	4	25	11	40
Subtotal	22	226	110	358
Taraba State				
Jalingo	186	1890	1000	4076
Zing	20	438	1279	1737
Subtotal	206	2328	3279	5813
Grand total	228	2554	3389	6171

Table 2. Sex and Age distribution of Tuberculosis in some selected cities in Niger and Taraba States between 1990 and 1994

Gender	Age in years			
	0 - 15	16 - 35	36 and above	Total
Niger				
Male	18	145	88	251
Female	4	69	39	112
Subtotal	22	214	127	363
Taraba State				
Male	136	1240	2029	3405
Female	165	593	1650	2408
Subtotal	301	1833	3679	5813
Grand total	323	2047	3806	6176

Jalingo had the highest number of cases in the state 3,422 (58.9%), while Zing had 2,391 (41.1%) cases (Table 5). Jalingo had the highest number of males involved 2,026 (59.5%) and the highest number of female cases 1,396 (58%) while Zing had 1,379 (40.5%) male cases and 1,012 (42.0%) female cases (Table 5).

The case fatality rates for males and females in Niger State were 20.5% and 17.3% respectively (Table 6). In Kogi State, they were 21% and 17% while in Taraba State, they were found to be 2.1% and 1.5% respectively within the five-year period under study (Table 6).

One hundred and nine cases of mortality were recorded in Taraba State for the five-year period made up of 72 (66%) in males and 37 (34%) in females (Table 6). Jalingo had the highest proportion of mortality 67 (61.5%) while Zing had 42 (38.5%) (Table 6). In the two locations studied, a higher proportion of male deaths were recorded than females, Jalingo, 42 (62.7%) out of 67 cases of mortality while Zing had 30 male deaths 71.4% of 42 deaths (Table 6). There was no statistically significant difference in the level and pattern of mortality due to the disease in the

population within the two cities except that the mortality rate was comparatively low in females in Zing [($\chi^2_{(df,1)}$= 0.86 < 3.84 = $\chi^2_{(df,1)0.95}$] (Table 6). Sixty-three cases of mortality were recorded in Kogi State for the study period made up of 39 (62%) in males and 24 (38%) in females (Table 6). The highest proportion of mortality 42 (66.7%) was recorded in Lokoja while Idah had the lowest number of deaths 5 (7.9%) (Table 6). In all four locations of the state, higher proportions of male mortality were recorded than in females There was however no statistically significant difference in the level and pattern of mortality due to the disease in the population within the cities except that there was a comparatively low mortality rate in females in Kotonkarfe.

Table 3. Distribution of tuberculosis for five-year period (1990-1994) in Niger, Taraba and Kogi States

Location	Sex	Year					
		1990	1991	1992	1993	1994	Total
Minna	M	35	24	40	49	14	162
	F	24	19	29	20	8	100
Subtotal		59	43	69	69	22	262
Aguara	M	15	12	2	3	20	52
	F	10	8	0	3	8	29
Subtotal		25	20	2	6	28	81
Paikoro	M	10	6	5	4	5	30
	F	4	1	2	0	3	10
Subtotal		14	7	7	4	8	40
Niger State total		98	70	78	59	58	363
Jalingo	M	460	259	460	457	390	2026
	F	336	259	212	289	300	1396
Subtotal		796	518	672	746	690	3422
Aguara	M	352	291	269	259	208	1379
	F	250	220	160	212	170	1012
Subtotal		602	511	429	471	378	2391
Taraba State total		1398	1029	1101	1217	1068	5813
Lokoja	M	29	33	21	25	19	127
	F	25	26	23	26	19	119
Subtotal		54	59	44	51	38	246
Idah	M	1	4	4	3	0	12
	F	1	1	2	2	0	6
Subtotal		2	5	6	5	0	18
Ajaokuta	M	2	7	4	10	7	30
	F	1	3	4	3	3	14
Subtotal		3	10	8	13	10	44
Kotonkarfe	M	0	9	0	8	0	17
	F	0	3	0	2	0	5
Subtotal		0	12	0	10	0	22
Kogi State total		59	86	58	79	48	330

For the five years study period, high mortality was observed in all the states in the year 1990 (Table 7). This was followed by a slight decline in 1991then a gradual increase in mortality until the end of the study period except in Niger State where a dramatic decline was noticed in 1994. These changes over time were not statistically significant.

Table 4. Relative risk and attributable risk of males and females in different locations of study

Location	Males		Female	
	Rel. risk	Att. risk	Rel. risk	Att. risk
Minna	1.42	0.174	0.704	-0.174
Aguara	1.79	0.29	0.56	-0.29
Paikoro	3.00	0.50	0.33	-0.50
Niger State	1.61	0.24	0.62	-0.24
Lokoja	1.06	0.04	0.94	-0.04
Ajaokuta	2.14	0.37	0.46	-0.37
Kotonkarfe	3.40	0.55	0.29	-0.55
Idah	2.00	0.34	0.50	-0.34
Kogi State	0.56	0.12	0.77	-0.12
Jalingo	1.45	0.81	0.67	-0.81
Zing	1.36	0.15	0.73	-0.15
Taraba State	1.14	0.17	0.71	-0.12

Table 5. Age distribution of mortality due to tuberculosis in selected cities in Niger and Taraba States between 1990 and 1994

Location	Sex	Number of deaths in age groups			
		0 - 15	16 - 35	36 and above	Total
Minna	M	6	17	9	32
	F	1	3	4	8
Subtotal		7	20	13	40
Aguara	M	1	3	6	10
	F	2	1	5	8
Subtotal		3	4	11	18
Paikoro	M	3	7	1	11
	F	0	1	1	2
Subtotal		3	8	2	12
Niger State total		13	32	26	71
Jalingo	M	2	18	22	42
	F	2	5	18	25
Subtotal		4	23	40	67
Zing	M	4	15	11	30
	F	2	2	8	12
Subtotal		6	17	19	42
Taraba State total		10	40	59	109

DISCUSSION

In the three states studied, six thousand five hundred and six cases were recorded. This is an indication of the gravity of tuberculosis prevalence in Nigeria and this is in agreement with the findings of Kaufmann and Embden

(1993) and Privat (1993) for other underdeveloped countries of the world. The level of the disease in Taraba State is extremely high compared with the two other states studied. The reason for this difference is not known with certainty but could be attributed to lack of awareness among the people and probably because of other competing economic demands in Taraba State than in Niger and Kogi States. The prevalence of tuberculosis was higher in males than in females in this study; this agrees with the reports of Kaufmann and Embden (1993), and Brisibe and Ahmed (1995)

Table 6. Morbidity, mortality and case fatality rates for various locations in the three States studied (Niger, Taraba and Kogi)

Location	Sex	Morbidity	Mortality	Case fatality rate (%)
Minna	M	142	25	17.6
	F	100	15	15.0
Aguara	M	52	10	19.2
	F	29	8	27.6
Paikoro	M	30	11	36.7
	F	10	2	20.0
Niger State total	M	224	46	20.5
	F	139	24	17.3
Jalingo	M	2026	42	2.0
	F	1396	25	1.8
Zing	M	1379	30	1.8
	F	1012	12	1.2
Taraba State total	M	3405	72	2.1
	F	2408	37	1.5
Lokoja	M	127	24	17.1
	F	119	18	15.1
Ajaokuta	M	30	6	20.5
	F	14	3	21.4
Kotonkarfe	M	17	6	32.0
	F	5	3	20.0
Idah	M	12	3	28.0
	F	6	2	23.0
Kogi State total	M	186	39	21.0
	F	144	24	17.0

In terms of disease prevalence among different age groups, there appear to be discrepancies among the different states studied. While the disease was found more in the 16-35 years age group in Niger State, which agrees with the findings of Kaufmann and Embden (1993), the age group of ≥ 36 years contributed most to the number of recorded cases in the state. This finding may be attributed to the socio-cultural background of the populace in the area. More people in this age bracket are involved in manual jobs such as farming, hunting and other high-risk jobs for sustenance thereby exposing them more to infection. In both Niger and Taraba States, the low prevalence of the disease may be attributed to the characteristic high virulence and case fatality rate of military TB in infants in which death usually occurs before final diagnosis is made. The general decline of TB in all the three states over the study period could be attributed to the success of the Tuberculosis Control Programme put in place in all three states.

Table 7. Mortality due to tuberculosis in different locations in the three states studied for the different years

Location	Year					
	1990	1991	1992	1993	1994	Total
Minna	17	3	8	12	0	40
Aguara	4	6	4	2	2	18
Paikoro	7	0	1	2	3	13
Niger State total	28	9	13	16	5	73
Jalingo	21	10	13	4	19	67
Zing	16	2	3	12	9	42
Taraba State total	37	12	16	16	28	109
Lokoja	15	7	3	5	12	42
Ajaokuta	2	0	3	4	0	9
Kotonkarfe	0	2	3	2	0	7
Idah	0	2	1	2	0	5
Kogi State total	17	11	10	13	12	63

The high case fatality rates of TB in Niger and Kogi States compared with Taraba State is not definitely known but a plausible explanation may be the fact that during the 1980s the Federal Government of Nigeria, through the Federal Ministry of Health put in place the Expanded Programme on Immunization (EPI). The execution of the EPI was not uniform in all the states of the federation and so were the beneficiaries of the programme and the level of awareness in each state. It is possible that these differences also translated to differences in levels and case fatality rates of TB in Taraba relative to Niger and Kogi States. With the differences in public awareness of the disease, disparity in educational standards, cultural and religious norms, prompt reporting of cases of disease which could lead to early commencement of treatment and better prognosis was possible in one state (in this case Taraba) relative to others (Niger and Kogi).

Mortality occurred more in males of the 16-35 years age group in Niger and Taraba States, a finding that agrees with Richard and Baker (1988) that a more serious outcome of primary infection is more frequent in infants and adolescents than older persons. This finding, however, contradicts that of Alugupalli *et al.* (1995); Kaufmann and Embden (1993) and Privat (1993) that most deaths from tuberculosis occur in older age brackets.

The health and economic impacts of TB to the nation is enormous as a large number of those affected are within their prime age when high output is expected from them by the society, thus reducing the nation's workforce in various disciplines. In addition, patients undergoing the course of treatment are often kept on admission for a minimum of three months and for those whose abodes were far away from the hospitals were kept for six months while those who lived in nearby towns were discharged after satisfactory improvement to continue as outpatients. These further reduced the person-hour outputs from such individuals thus resulting in lower efficiency in the country's workforce. Tuberculosis is, of course, a disease that could result in mortality thus many lives could be lost if affected people are not adequately treated. Bacillus Calmette and Guerrin (BCG) immunization plays an important role in preventing the disease especially in children against infection. Vaccination of infants with BCG should, therefore, be encouraged in high morbidity areas such as Nigeria, as this may be partly responsible for the low level of disease in the 0-5 years age group.

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